**PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Liaoning Guoli Fuxin Wangsiyingzi Wind Power Project
Version number of the PDD	03
Completion date of the PDD	19/12/2012
Project participant(s)	Liaoning Guoli Renewable Energy Co. Ltd.
Host Party(ies)	People's Republic of China
Sectoral scope and selected methodology(ies)	Sectoral scope 1: Energy industries (renewable - / non-renewable sources). Methodology: **Approved consolidated baseline and monitoring methodology ACM0002** "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" --- Version 13.0.0
Estimated amount of annual average GHG emission reductions	93,051tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Liaoning Guoli Fuxin Wangsiyingzi Wind Power Project (hereafter referred to as the Proposed Project) is invested and operated by Liaoning Guoli Renewable Energy Co. Ltd. (hereafter referred to as the project owner). The purpose of the Proposed Project is to utilize the wind energy for generating electricity which will be delivered to the Northeast Power Grid (hereafter referred to as the NEPG) through Liaoning Power Grid. The delivered electricity can replace equivalent electricity in the Northeast Power Grid which is generated by fossil fuel.

The Proposed Project is located in Furong Town, Fuxin City, Liaoning Province, P. R. China. The total installed capability will be 48MW, consisting of 24 sets of 2 MW wind turbines, where the annual electricity delivered to the grid is 96,576 MWh. The Proposed Project activity is expected to reduce Greenhouse Gas (GHG) emissions of 93,051 tCO_2e annually.

Before the implementation of the Proposed Project, there is no power plant at the project site; the electricity that would have otherwise been generated by the Proposed Project was provided by the NEPG The baseline scenario of the Proposed Project, as fully described in section B.4, is the same of the existing scenario prior the starting of Proposed Project.

The development of the Proposed Project is in compliance with the preference of the Chinese energy industry, and it will also optimize the regional energy structure. The Proposed Project will contribute to sustainable development in the following aspects:

- Reduce GHG emissions by replacing electricity predominantly generated by fossil fuel-fired power plants in the Northeast Power Grid with wind energy;
- Reduce the emission of pollutants, such as sulphur dioxide and dust, which result from fossil fuel combustion and consumption;
- The proposed project could be helpful to diversify power mix of Northeast Power Grid;
- Increase local employment during both the assembly and installation of the wind turbines and operation of the wind farm.

A.2. Location of project activity

A.2.1. Host Party(ies)

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P.R.China

A.2.2. Region/State/Province etc.

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Liaoning Province

A.2.3. City/Town/Community etc.

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Furong Town, Fuxin City

A.2.4. Physical/Geographical location

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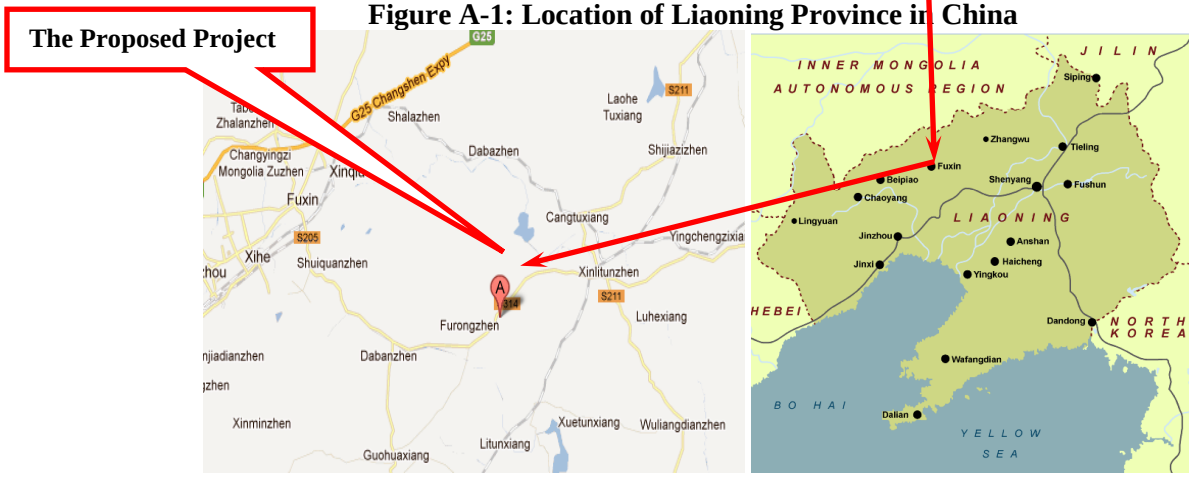
The Proposed Project is located in Furong Town, Fuxin City, Liaoning Province, P. R. China. The geographical coordinates of the wind farm are around 120.9833 °E～122.1167 °E, 41.95 °N～42.05 °N. The centre geographical coordinate of the wind farm is N41.9922 °, E122.0563 °.

Figure A-1: Location of Liaoning Province in China



FigureA-2: Location of the Proposed Project in Liaoning Province

A.3. Technologies and/or measures

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The Proposed Project aims to generate electricity from wind resources and to displace the equivalent electricity from the NEPG where the electricity generation is dominated by coal-fired power plants.

The existing scenario prior to the start of the implementation of the Project is: electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation source of NEPG. The baseline scenario as identified

in section B.4 of this PDD is the same as the existing scenario prior to the start of the implementation of the Project.

The Proposed Project will install 24 sets of 2MW wind turbines. The total installed capacity is 48MW. The annual operating hours of the Proposed Project are 2,012 hours in full load, and the plant load factor is calculated to be 22.97%[1]. The power will be delivered through 220KV station to the Liaoning power grid then to the NEPG. The corresponding power supplied to the grid is estimated to be 96,576 MWh annually.

The selected models of the wind turbines has been given full consideration by the project owner based using the cost & benefit analysis, the construction condition of the land to be used, and the technical development level of the manufacturer etc. done in the Feasibility Study Report.

The main technical specifications of the wind turbine are provided in the following table.

Table A-1 Key Technical specifications of wind turbine[2]

Items	Proposed Wind turbine	Unit
Installed capacity (each wind turbine)	2	MW
Rotor diameter	102	m
Cut in speed	3	m/s
Rated wind speed	10.2	m/s
Cut out speed	25	m/s
Hub height	80	m
Rated voltage of generator	690	V
Rotational direction	Clockwise (front view)	-
Number of blades	3	pieces
Rated frequency	50	Hz
Designed product life	20	Year

Based on methodology ACM0002 (Version 13.0.0) and the delineation of grid boundaries provided by the DNA in China[3], the Northeast Power Grid, including Heilongjiang Power Grid, Jilin Power Grid, Liaoning Power Grid, is a project electricity system. Related analysis is conducted in B.6.1 Step 1.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R. China (host)	Liaoning Guoli Renewable Energy Co. Ltd.	No

A.5. Public funding of project activity

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[1] The PLF is calculated using the equation below: PLF= Net electricity generation /(Designed capacity of the Project ×8760h)= 96576MWh/(48MW×8760h)= 22.97%.

[2] Data source from the FSR.

[3] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

The Proposed Project will not receive any public funding from Parties included in Annex I of the UNFCCC.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

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Baseline methodology and monitoring methodology applied for the proposed project: ACM0002 (Consolidated baseline methodology for grid-connected electricity generation from renewable sources [4] ---- Version 13.0.0, EB 67, 11 May 2012).

The methodology also refers to the latest approved versions of the following tools:

- Tool to calculate the emission factor for an electricity system (Version 2.2.1, EB63, 29 September, 2011)[5];
- Tool for the demonstration and assessment of additionality (Version 6.1.0, EB69, 13 September, 2012)[6].

For more information regarding the methodology and the tools as well as their consideration by the Executive Board please refer to *http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html*.

B.2. Applicability of methodology

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The methodology ACM0002 (Version 13.0.0) is chosen and applicable to the Proposed Project due to the following reasons:

No.	Applicability criteria in the ACM0002	Project Activities	Applicable (Yes/No)
1	*This methodology is applicable to grid-connected renewable power generation project activities that:(a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).*	The Proposed Project activity is the installation of a new wind farm at the site where no renewable power plant was operated prior to the implementation of the project activity. The electricity generated by the Proposed Project will be provided to the Northeast Power Grid. The geographic and system boundary of the Northeast Power Grid can be clearly identified and information on the characteristics of the grid is available Hence, (a) is applicable.	Yes
2	*The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind*	The Proposed Project activity is the installation of a new wind farm at the site where no renewable power plant was operated prior to the implementation of the project activity;	Yes

[4] http://cdm.unfccc.int/UserManagement/FileStorage/DYPFI935XBG274NWH6O8CM1KEZR0VU
[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf
[6] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf

	power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;		
3	*In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.*	The Proposed Project activity is the installation of a new wind farm at the site.	No related
4	*In case of hydro power plants:* • *One of the following conditions must apply:* o *The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or* o *The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m^2; or* o *The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m^2.*	The Proposed Project activity is the installation of a new wind farm at the site.	No related

	In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m^2 all the following conditions must apply: • *The power density calculated for the entire project activity using equation 5 is greater than 4 W/m^2;* • *Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project that collectively constitute the generation capacity of the combined power plant;* • *Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;* • *Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m^2, is lower than 15 MW;* • *Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m^2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.*		
5	*The methodology is not applicable to the following:* • *Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;*	The Proposed Project does not involve switching from fossil fuels to renewable energy at the site of the project activity	Yes

	• *Biomass fired power plants;* • *A hydro power plant[7] that results in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m^2.*		

No.	Applicability criteria in the "Tool to calculate the emission factor for an electricity system"	Project Activities	Applicable (Yes/No)
1	*This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).*	The Tool is applied to estimated the OM, BM and CM when calculating baseline emissions for the Proposed Project activity, which substitutes grid electricity.	Yes
2	*The tool is not applicable if the project electricity system is located partially or totally in an Annex I country.*	The grid connected to the Proposed Project activity is located in the China, which is not an Annex I country.	Yes

Therefore, the Proposed Project is a new grid-connected wind power generation project and the approved consolidated baseline and monitoring methodology ACM0002 (Version 13.0.0) and the "Tool to calculate the emission factor for an electricity system" are applicable to the Proposed Project.

B.3. Project boundary

Emission sources:

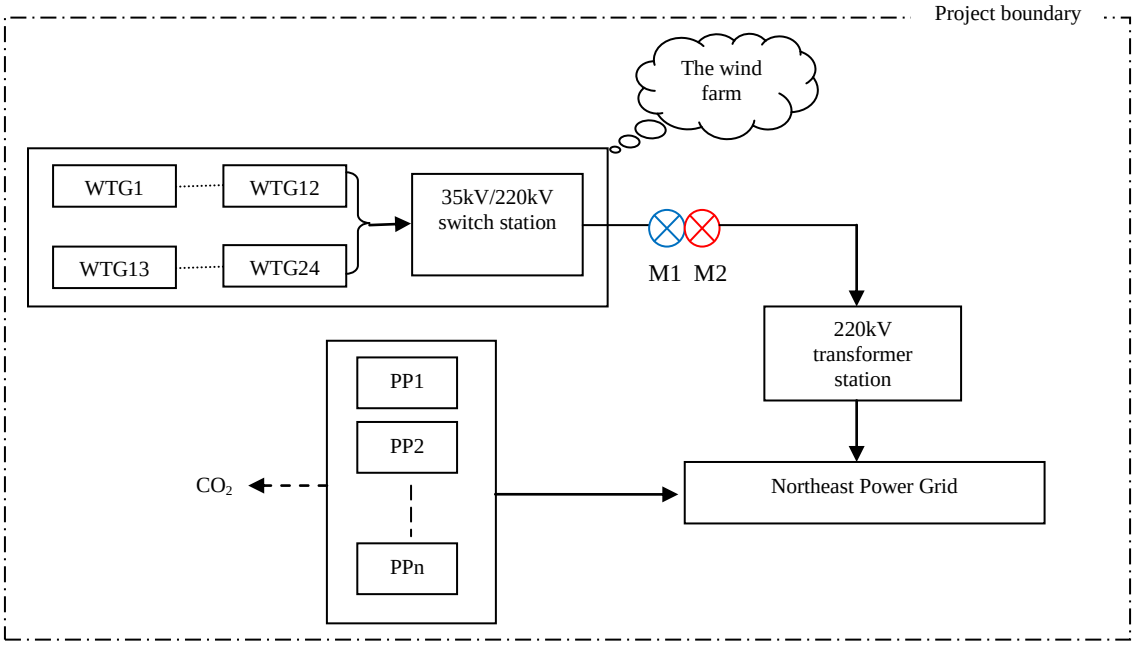
For the baseline determination only CO_2 emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account.

Spatial boundary:

Based on methodology ACM0002 (Version 13.0.0) and the delineation of grid boundaries provided by the DNA in China[8], the Northeast Power Grid, including Heilongjiang Power Grid, Jilin Power Grid, and Liaoning Power Grid, is a project electricity system. Related analysis is conducted in B.6.1 Step 1. Thus, the spatial extent of the project boundary includes the project site and all power plants physically connected to the Northeast Power Grid. The figure below shows the boundary of the Proposed Project.

[7] Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

[8] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf



Where: PP1, PP2, …, PPn: fossil fuel fired power plants physically connected to the Northeast Power Grid;
WTG_1, WTG_2...WTG_{24}: the power generating units including wind turbines and generators;
⊗ M1: The key meter;
⊗ M2: The backup meter;
Broken line: the project boundary;
Dotted arrow: the baseline emissions.

According to ACM0002 (Version 13.0.0), the GHGs included or excluded from the project boundary are listed as follows:

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source, following ACM0002
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam.	CO_2	No	Not applicable to wind.
		CH_4	No	
		N_2O	No	
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Not applicable to wind.
		CH_4	No	
		N_2O	No	
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Not applicable to wind.
		CH_4	No	
		N_2O	No	

B.4. Establishment and description of baseline scenario

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According to identification of the baseline scenario specified by the methodology ACM0002 (Version 13.0.0), the baseline scenario for the installation of a new grid-connected renewable power plant is as follows:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system (Version 2.2.1, EB63, 2011)", which is detailed in the Annex 4.

According to the latest version of "Tool to calculate the emission factor for an electricity system (Version 2.2.1, EB63, 2011)", if the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, the delineation should be used. The electricity generated by the proposed project will be delivered to the NEPG. Therefore, as per "Tool to calculate the emission factor

for an electricity system (Version 2.2.1, EB63, 2011)" and the delineation given by Chinese DNA, the NEPG is defined as the project electricity system and included in the project boundary of the proposed project.

The aforementioned information can also be proved in section B.5 and B.6.

B.5. Demonstration of additionality

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The Proposed Project is to utilize wind energy for generating electricity which will be delivered to the Northeast Power Grid which is currently dominated by fossil fuel power generation. The delivered electricity can replace equivalent electricity in the Northeast Power Grid which is generated by fossil fuel.

CDM consideration

Following EB guidelines (EB 49 Annex 22) the project participant informed the Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of the intention to seek CDM status, as the starting date of the project activity is after 2 August 2008. This notification was made within six months of the project activity start date as shown in the timeline below.

In addition to this confirmation of serious prior consideration of the CDM by the project participants, the timeline below indicates continuing and real actions to secure CDM status for the project in parallel with its implementation.

Table B-2 Timeline of the Proposed Project

Project Implementation Timeline (A)	CDM Development Timeline (B)
December 2011: The EIA report was completed by Shenyang Technology Research Institute	
December 2011: Liaoning Power Design Institute Completed the FSR.	**December 2011:** CDM development was considered in the FSR.
December 29, 2011: Obtained the approval of EIA issued by Liaoning Environmental Protection Bureau.	
December 31, 2011: Obtained the approval of FSR issued by Liaoning Development and Reform Commission.	
February 28, 2012: The main equipment purchase contract was signed, which is the Project activity start date)	
	April 18, 2012: Notification of the intension to develop this project as CDM to UNFCCC.
	April 25, 2012: Notification of the intension to develop this project as CDM to NDRC.
	April 25, 2012: Signed the ERPA
	May 9, 2012: Signed the contract of CDM Consulting Service with COWI China.
April 1, 2013: The project will start operational	

The additionality analysis of the Proposed Project scenario is demonstrated by using "Tool for the Demonstration and Assessment of Additionality" (Version 6.1.0) as pointed out in the baseline methodology ACM0002 (Version13.0.0). The tool includes the following steps:

Step 1 Identification of alternatives to the project activity consistent with current laws and regulations

Define realistic and credible alternatives to the project activity through the following sub-steps:

Sub step 1a. Define alternatives to the project activity:

Identify realistic and credible alternative(s) available to the project participants that provide outputs or services comparable with the proposed CDM project activity. According to Clause (4) quoted from "Tool for the demonstration and assessment of additionality" (Version 6.1.0).

"Project activities that apply this tool in context of approved consolidated methodology ACM0002, only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity."

Therefore, these alternatives are to include:

(a): The Proposed Project activity undertaken without being registered as a CDM project activity;
(b): The equivalent electricity delivered to the grid by the project activity is supplied by NEPG.

Sub step 1b. Consistency with mandatory laws and regulations:

The alternatives are realistic and feasible and in compliance with all mandatory applicable legal and regulatory requirements.

Alternative a) the proposed project had been approved by Liaoning Development and Reform Commission, and the proposed project was also in compliance with People's Republic of China Renewable Energy Law (Published on February 28, 2005) and Amendment[9] (Published on December 26, 2009), therefore, Alternative a) meets Chinese current regulations and laws.

Alternative b) is the continuation of existing scenario and in compliance with all mandatory applicable legal and regulatory requirements in China and faced with no economical difficulties. Furthermore, the annual electricity output of NEPG has been increasing for many years[10]. Hence, the Alternative b) is a credible and realistic alternative.

In conclusion, the credible and realistic alternatives for power generation are Alternative (a) and Alternative (b).

Step 2 Investment analysis
The purpose of this step is to determine whether the Proposed Project activity is financially less attractive than other alternatives without revenues from the sale of CERs. The investment analysis was done in the following steps:

Sub step 2a. Determine appropriate analysis method
According to the *Tool for the demonstration and assessment of additionality* (Version 6.1.0), the project

[9] http://www.gov.cn/flfg/2009-12/26/content_1497462.htm
[10] China Electric Power Yearbook 2007-2009

developer has to select one of the three alternative financial analyses, including the simple cost analysis (Option I), the investment comparison analysis (Option II) and the benchmark analysis (Option III), for this step.

The proposed wind power project has sole revenue from selling power to the local grid apart from other CDM related revenue. Therefore the simple cost analysis (Option I) cannot applied to the Proposed Project activity. The investment comparison analysis (Option II) and the benchmark analysis (Option III) are alternative analysis methods for the Proposed Project. Investment comparison analysis method (option II) is applicable to projects whose alternatives are also investment projects. Only on such basis, comparison analysis can be adopted. The alternative baseline scenario of the Project Activity is continued import of electricity from the Northeast Power Grid rather than the specific replaceable investment projects, thus option II is not an appropriate method.

The Proposed Project will use the benchmark analysis method (Option III).

Sub step 2b. Option III Apply benchmark analysis
The IRR is identified as the benchmark. The difference in IRR between the Proposed Project and the business as usual practice will determine whether the Proposed Project is economically less attractive than the benchmark. If the IRR of the Proposed Project is higher than of the benchmark, the project is economically attractive.

According to the *Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects*, issued by Operation Department of Power Generation and Transmission in State Power Corporation, the IRR benchmark of the total investment (after tax) of power industry is 8%. Presently, 8% of IRR of the total investment is determined as the benchmark of the Proposed Project, and calculation and comparison of IRR are conducted in the sub step 3c.

Sub step 2c. Calculation and comparison of financial indicators
The Proposed Project will sell the electricity generated from the wind power resource to the Grid and obtain its main revenue from the sale of electricity.

The financial analysis for the Proposed Project is based on a period of 20 years (project lifetime). The following parameters from the project feasibility study report will be used:

Table B-3 Finance parameters of the Proposed Project

No.	items	Data	Remark	Resource
General features				
1	Installed capacity	48.00	MW	FSR
2	Operating hours with full load	2,012	hours	FSR
3	Electricity delivered to the grid	96.576	GWh	FSR
4	Power tariff（incl. VAT）	0.6100	RMB/kWh	FSR
5	Power tariff（excl. VAT）	0.5214	RMB/kWh	FSR
6	CER	10.5	Euro/t	
Investment plan				
1	Total investment	46,183.85	10,000RMB	FSR
Financing				
1	Long-term lending rate	7.05%		FSR
2	short-term lending rate	6.56%		FSR
Tax				
1	VAT rate	17%		FSR
2	VAT deduction rate	8.50%		FSR
3	Income tax	25%		FSR

4	Additional urban construction tax	5%		FSR
5	Education surcharges	5%		FSR
Cost				
1	Average annual O&M Cost	1313.57	10,000RMB/yr	FSR

Table B-4 Summary of project financial analysis without and with CDM financing

	Without CDM	With CDM
IRR	6.30%	8.91%

Table B-4 shows the financial analysis for the Proposed Project. The project IRR without CERs revenue will be 6.30%, being lower than the benchmark of power industry in China. Taking into account the CERs revenue, the project IRR will be 8.91% which will be higher than the benchmark. In conclusion, the Proposed Project without CDM financing will be financially unattractive. The CERs revenue is crucial for the project to overcome the financial barrier.

Sub step 2d. Sensitivity analysis (only applicable to options II and III)

According to " Guidelines on the assessment of investment analysis" (version 05, EB 62, Annex5)[11], only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. As a general point of departure variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances. The proposed project does not involve specific project circumstances since it is a wind power project in Liaoning, where the wind energy is abundant and a great number of wind farms are already located. For the Project, the financial parameters selected as sensitive factors for the sensitivity analysis of financial attractiveness are the static investment cost and the variables that constitute more than 20% of either total project costs or total project revenues. The variation range of the parameter is from -10% to +10%.[12]

The following financial parameters are taken as sensitive factors for sensitivity analysis:

- Static investment
- Project operational and maintenance costs
- Power supplied to the Grid
- Power tariff

Table B-5 summarizes the results of the sensitivity analysis, while Figure B-1 provides a graphic depiction.

[11] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

[12] Source: Page145, "Financial analysis and parameters in project construction" issued by National Development and Reform Commission and the Ministry of Construction. In sensitivity analysis, generally, the variation range of the parameters could be based on one of the following percentage: +/-5%, +/-10%, +/-15% and +/-20%. Therefore, +/-10% is a reasonable variation range.

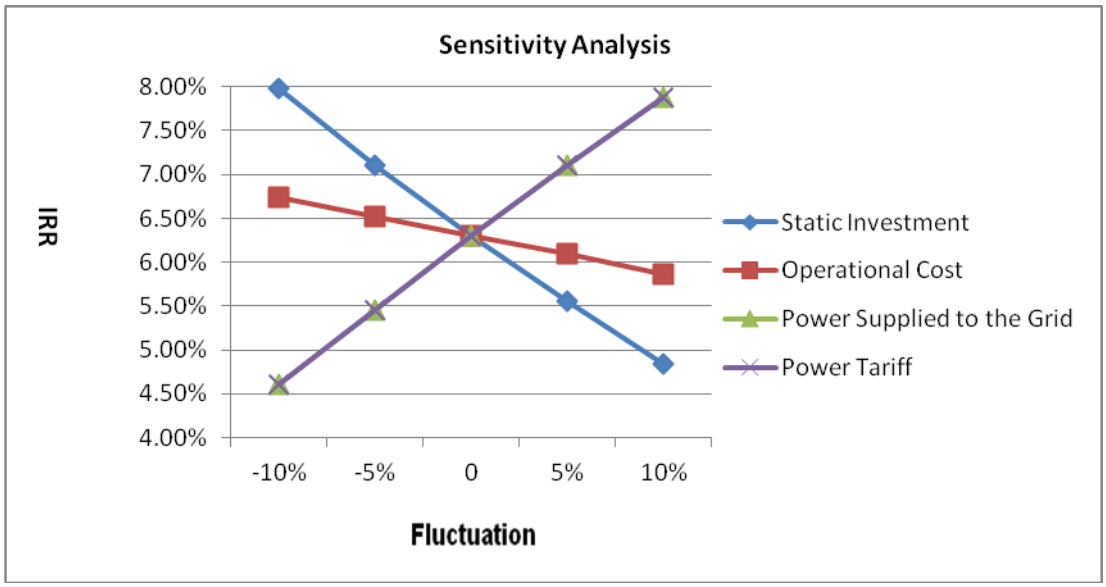

Figure B-1: Sensitivity Analysis

Table B-5 Total Investment IRR Sensitivity Analysis-1

Fluctuation / Parameter	-10%	-5%	0	5%	10%
Static Investment（Without CERs）	7.98%	7.11%	6.30%	5.55%	4.84%
Project operational and maintenance cost（Without CERs）	6.74%	6.52%	6.30%	6.09%	5.86%
Power supplied to the Grid（ Without CERs）	4.60%	5.46%	6.30%	7.11%	7.88%
Power tariff (Without CERs)	4.60%	5.46%	6.30%	7.11%	7.88%

Table.B-5 shows that none of variations can raise the project IRR post-tax of the Proposed Project higher than the benchmark of 8%. Furthermore, significant variation of the above mentioned parameters is unrealistic considering the following:

Table B-6 Total Investment IRR Sensitivity Analysis-2

Fluctuation / Parameter	-10.11%	-40.14%	10.74%	10.74%
Static Investment（Without CERs）	8%	-	-	-
Project operational and maintenance cost（Without CERs）	-	8%	-	-
Power supplied to the Grid（ Without CERs）	-	-	8%	-
Power tariff (Without CERs)	-	-	-	8%

Static Investment: When IRR reaches the benchmark, the static investment must be decreased by 10.11% and it is unlikely that the total investment cost decreases. The static investment in FSR of the Proposed Project was 461.8385 million RMB. For the wind farm projects, the cost of turbine, engineering construction and related accessories comprise the majority budget of the total investment cost. Even

though the financial crisis of 2007 to the present has resulted in economic depression worldwide, China has kept its economic growth. China's Consumer Price Index (CPI) and Producer Price Index (PPI) have turned positive since December 2009[13], CPI is 3.3% and PPI is 5.5%[14] in 2010 and CPI is 5.4% and PPI is 6.0%[15] in 2011 in China. It means that the prices of raw materials, equipments and man power have been increasing. The static investment in FSR of the Proposed Project was estimated based on the price level in Quarter 1 of 2010. It is expected that the total investment cost will be increased in parallel with the increasing CPI and PPI. Therefore, a decrease of 10.11% in static investment is unrealistic.

Operational and maintenance cost: As shown in Table B-5 and Figure B-1, operating cost has no significant impact on the IRR. For the IRR to reach the benchmark, the operational and maintenance cost must fall by 40.14%. In addition, CPI is 3.3% and PPI is 5.5%[16] in 2010 and CPI is 5.4% and PPI is 6.0%[17] in 2011 in China, it is impossible that the operation cost is lower than the estimated value. Because the operation cost covers necessary disbursements such as maintenance & repair expenses, material cost, insurances, salary & welfare, etc, the probability of such a decrease in operational and maintenance cost is very small.

Power supplied to the Grid: When IRR reaches the benchmark, the power supplied to the Grid must be increased by 10.74%. According to the FSR of the proposed project, the annual output is estimated based on the almost 30 years weather statistical data provided by local meteorological station from 1980 to 2009 and the wind speed data measured on site from 1st June, 2010 to 31st May 2011. The annual generated electricity is calculated using WAsP by independent Design Institute. The operating hours are likely to fluctuate only within a small range. In addition, the rated capability of the wind-turbine and generator is fixed. Hence, the power supplied to the Grid is likely to fluctuate within a small range which is unlikely to reach 10.74%.

Power tariff: For IRR to reach the benchmark, the power tariff must be increased by 10.74%. The power tariff is strictly controlled by the government. According to the tariff notification issued by NDRC on 20 July 2009 (Fa Gai Jia Ge [2009]1906)[18], the tariff in Liaoning is 0.61RMB/kWh (with VAT). The notification was also the basis of the tariff expectation in FSR. Moreover, this tariff is same to the tariff listed in INFORMATION NOTE ON THE HIGHEST TARIFFS APPLIED BY THE EXECUTIVE BOARD IN ITS DECISIONS ON REGISTRATION OF PROJECTS IN THE PEOPLE'S REPUBLIC OF CHINA [19]. The power tariff is unlikely to be increased by 10.74%.

To sum up, in the absence of the CDM revenue stream, these reasonable variations conducted in the sensitivity analysis do not influence the fact that without CERs, the IRR is lower than benchmark.

Step 3 Barrier analysis

There is not any barrier to prevent the implementation of alternative (a) and (b), but the Proposed Project activity not undertaken as a CDM project activity [alternative (a)] will be less attractive economically as demonstrated above, as it is analyzed in Step 2.

Step 4. Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity

According to the Guidance on the common practice (Version 01.1), the common practice analysis is described as following steps:

[13] http://blog.chinatells.com/2010/02/4069
[14] http://news.xinhuanet.com/fortune/2011-01/20/c_121003561.htm
[15] http://news.sohu.com/20120117/n332422898.shtml
[16] http://news.xinhuanet.com/fortune/2011-01/20/c_121003561.htm
[17] http://news.sohu.com/20120117/n332422898.shtml
[18] http://www.ndrc.gov.cn/zcfb/zcfbtz/2009tz/t20090727_292827.htm
[19] http://cdm.unfccc.int/Reference/Notes/reg_note07.pdf

Step 4a-1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

The project activity is a 48MW wind power project. The e applicable output range is selected as +/-50% of the design capacity of the proposed project activity, which is 24~72MW;

Step 4a-2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities shall not be included in this step.

Step 4a-2.1 Identify the applicable geographical area

In China, provincial governments are authorized to regulate wind power projects in each province by the NDRC, so the investment climate, tariff, land policy, regulations etc. are usually similar for wind power projects in the same province. The location of the proposed project belongs to Liaoning Province. Therefore, Liaoning Province is selected as the geographical scope for the common practice analysis of the project.

Step 4a-2.2 Identify the applicable projects

Since the starting date of the project activity was February 2012, the projects started before February 2012 shall be identified. As per the guideline on common practice, all the projects generate power within the capacity range of 24~72MW shall be listed. PP divided the plants into two categories, $N_{\text{all wind power plants}}$ and $N_{\text{all other power plants}}$.

Hence, $N_{all} = N_{\text{all wind power plants}} + N_{\text{all other power plants}}$

As per the Installed Capacity of Wind Farms in China 2007-2010 and China Wind Farm Installation Capacity Statistic of 2011[20] issued by Chinese Wind Energy Association, China Electric Power Yearbook（2011）and information on the UNFCCC website, it is known that all the wind power projects in Liaoning are seeking help from applying CDM[21]. Up to now, all the wind farms within the range of 24 MW to 72 MW as the proposed project with commercial date after 2002 in Liaoning have been developed as CDM projects.

Thus, $N_{\text{all wind power plants}}=0$; and N_{all} is $0+ N_{\text{all other power plants}}$.

Step 4a-3, within plants identified in Step 2; identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

[20] http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=39 ; http://www.cwea.org.cn/download/display_info.asp?cid=9&sid=&id=44

[21] 1) China Electric Power Yearbook（2011）: in the end of 2010 there were 38 wind power project more than 6MW capacity in Liaoning Province, the total capacity was 2981.7MW.
2) China Wind Farm Installation Capacity Statistic of 2011: in the end of 2010 the total wind power capacity in Liaoning Province was 4066.9MW.
3) China Wind Farm Installation Capacity Statistic of 2011: in the end of 2011 the total wind power capacity in Liaoning Province was 5249.3MW.
4) Information on the UNFCCC website: in the end of 2011 the total wind power capacity application for CDM in Liaoning Province was 4859.8MW, all the project capacity are more than 6MW.
5) According to 1) & 2), the total capacity which the projects are below 6MW was 1085.2MW in the end of 2010.
6) According to 3) & 5), in the end of 2011 the total capacity was less than 4164.1MW (excluding the wind power projects which capacity below 6MW) in Liaoning Province.
7) According to 4) & 6), obviously all the wind power projects in Liaoning are seeking help from applying CDM.

$N_{\text{all other power plants}}$ identified above have different energy source from wind power. Thus, N_{diff} is identified in this step as all the other power plants within the capacity of 24~72MW located in Liaoning Province. $N_{diff} = N_{\text{all other power plants}}$.

Step 4a-4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.
$F= 1-N_{diff}/N_{all} =1- N_{\text{all other power plants}} / N_{\text{all other power plants}} =0$ & $N_{all}-N_{diff}=0$

Sub-step 4b: Discuss any similar options that occurring
Since the factor F is less than 0.2 and $N_{all} - N_{diff}$ is less than 3, it is concluded that the proposed project activity is a not common practice within the electricity generation sector in the applicable geographical area.
As indicated above, all the similar wind farms in Liaoning Province have already successfully been registered or are applying for CDM registration.
As stated in Sub-step 4a and Sub-step 4b, the proposed project is not a common practice.
Conclusion of the assessment and demonstration of additionality
To summarize, "the Project is undertaken without being registered as a CDM project activity" is not financially attractive to investors, thus it is not feasible. Being registered as a CDM project, the CERs revenues can alleviate the identified barriers, therefore the Project is additional.

B.6. Emission reductions
B.6.1. Explanation of methodological choices
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As mentioned in section B.2, the methodology ACM0002 (Version 13.0.0) is applicable to the Proposed Project. The emission reductions (ER_y) for the Proposed Project are calculated according to the methodology ACM0002 as following:

$$ER_y = BE_y - PE_y \quad (1)$$

Where:
ER_y = Emission reductions in year *y* (t CO_2e)
BE_y = Baseline emissions in year *y* (t CO_2e)
PE_y = Project emissions in year *y* (t CO_2e)

- **Project emissions:**

The Proposed Project is a wind farm. The Proposed Project will not use any fossil fuel during the operation. Hence, the project emissions shall be accounted by using the following equation:

$$PE_y = 0 \quad (2)$$

Where:
PE_y = Project emission in year *y* (t CO_2e)

- **Baseline emissions**

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y} \quad (3)$$

Where:

BE_y = Baseline emissions in year y (tCO_2).

$EG_{PJ, y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{grid, CM, y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (version 2.2.1) (tCO_2/MWh).

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ, y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions. The Proposed Project is involves in a new grid-connected wind project. So case (a) is selected.

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{\text{facility,y}} \quad (4)$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EG_{facility,y}$ = Quantity of the total electricity generation of the existing plant(s) or unit(s) and the added plant(s) or unit(s) to the grid in year y (MWh).

Calculation of $EF_{grid, CM,y}$

This methodological tool "Tool to calculate the emission factor for an electricity system" (version 2.2.1) determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the combined margin emission factor (CM) of the electricity system. The CM is the result of a weighted average of two emission factors pertaining to the electricity system: the operating margin (OM) and the build margin (BM). The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed CDM project activity. The build margin is the emission factor that refers to the group of prospective power plants whose construction and future operation would be affected by the proposed CDM project activity.

The tool "Tool to calculate the emission factor for an electricity system" (version 2.2.1) provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{grid, CM,y}$	tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y
$EF_{grid, BM,y}$	tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y
$EF_{grid, OM,y}$	tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y

The following six steps are applied to calculate the emission factor for an electricity system:

STEP 1: Identify the relevant electricity systems.
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional).
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method.
STEP 5: Calculate the build margin emission factor.
STEP 6: Calculate the combined margin (CM) emissions factor.

Step1 Identify the relevant electricity systems
In accordance with the boundary definitions of the DNA in China, the spatial extent of the project boundary includes the wind farm project and all other power plants connected physically to the Northeast Power Grid that the Proposed Project power plant is connected to. The Northeast China Power Grid is defined as the Project electricity system, which consists of independent province-level electricity systems including Heilongjiang, Jilin and Liaoning province that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraints. Hence, the electric power system is identified as the Northeast Power Grid.

Electricity transfers from connected electricity systems to the Northeast Power Grid are defined as electricity imports and electricity transfers to connected electricity systems are defined as electricity exports.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system (the Northeast Power Grid).

Step 2 Choose whether to include off-grid power plants in the project electricity system (optional).
The following two options to calculate the operating margin and build margin emission factor can be chosen:
Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

For the proposed activity, option I is used to calculate the OM and BM emission factor.

Step 3 Select a method to determine the operating margin (OM)
The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:
(a) Simple OM, or
(b) Simple Adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

Simple OM (option a)
Any one of the four methods can be used, however, the simple OM method (option a) can only be used if low-cost/must-run resources[22] constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Based on the data in China Electric Power Yearbooks 2006-2010, the generation percentage of low cost/ must run resources are 6.89% in 2009, 5.799% in 2008, 5.527% in 2007, 5.249% in 2006, and 8.277% in 2005 of total

[22] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

generation of the Northeast Power Grid, respectively. Therefore, the Simple OM (option a) is chosen to calculate OM emission factor for the Proposed Project.

The simple OM emissions factor can be calculated using either of the two following data vintages:

Ex ante option: 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or

Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required for calculating the emission factor for year *y* is usually only available later than six months after the end of year *y*, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year *y*, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

For the Proposed Project, the ex ante option of the data vintages is chosen to calculate the emission factor of the Northeast Power Grid.

Step4 Calculate the operating margin emission factor according to the selected method
The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

- Based on the net electricity generation and a CO_2 emission factor of each power unit; (Option A) or
- Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system. (Option B)

Option B can only be used if:

- The necessary data for Option A is not available; and
- Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

According to Option B, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (5)$$

Where:
$EF_{grid,OM\ simple,y}$ = Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i,y}$ = Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)
$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
$EG\ y$ = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year *y* (MWh)
i = All fossil fuel types combusted in power sources in the project electricity system in year *y*

y = The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

Regarding parameter selection, local values of $NCV_{i,y}$ and $EF_{CO2,i,y}$ should be used where available. If no such values are available, IPCC world-wide default values are preferable. The Net Calorific Value ($NCV_{i,y}$) of each type of fossil fuel used in the calculation comes from China Energy Statistic Yearbook 2010. Emission factors ($EF_{CO2,i,y}$) of each type of fossil fuel come from IPCC 2006 default values. The net electricity generated and delivered to the grid and the amount of fossil fuel consumed by all power sources serving the system, not including low-cost / must-run power plants / units, come from China Electric Power Yearbook from 2008 to 2010 (See Annex 4 for detailed information).

Given the above, the simple operating margin CO_2 emission factor ($EF_{grid,OM\ simple}$) of the Northeast China Power Grid is 1.0852 tCO_2/MWh. The detailed calculations and data are listed in the Annex 4.

Step 5 Calculate the build margin (BM) emission factor
According to "Tool to calculate the emission factor for an electricity system (Version 2.2.1, EB63, 2011)", in terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The project participants chose the Option 1 to calculate the build margin emission factor *ex-ante*.

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-}units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

(c) From $SET_{5\text{-}units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

In China, the power plants see the build margin as the vital business data, so it is very difficult to find the available data about the power units consists of either the set of 5 power units that have been built most recently, or the set of power capacity additions in the electricity system generation (in MWh) and that have been built most recently. To resolve this problem, the Executive Board (EB) has approved the project participants to use the methodological deviation[23] as follows:

(1) Use of capacity additions during the last 1-3 years for estimating the build margin emission factor for grid electricity.

(2) Use of weights estimated using installed capacity in place of annual electricity generation. And it is suggested that the project participants use the efficiency level of the best technology commercially available in the provincial, regional or national grid of China, as a conservative proxy.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (6)$$

Where:
$EF_{grid,BM,y}$ =Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available.

No matter how to identify sample group to calculate BM factor mentioned in step 4, the same issue on data availability must be addressed. Currently, it is very difficulty to obtain the capacity margin data of power plants in China, since these data as well as net quantity of electricity generated and delivered to the grid and fuel consumption data in power unit m are regarded as commercial secrets or only for internal usage. Then the following deviation was adopted to calculate the Build Margin emission factor.

1. The breakdown data by power plants are not while the aggregate data by different types of fuels are available. Considering this situation, the *m* sample group will consist of capacity addition by power sources with same fuel instead of by power plants. For the proposed project the *m* sample group will consist of fossil fuel fired capacity addition, hydropower capacity addition and other capacity addition;

2. Assuming that all the power plants with same fuel type have equal annual operation hours, and identify the starting year t_0 which the power capacity additions from t_0 to t_0 (i.e. the recent year of which the latest data is available) in the electricity system that comprise 20% of the system generation (in MWh).

The capacity addition belonging to *m* sample group thus could be identified. For the proposed project, the most recent year of which data is available is 2008, while t_0 =2000, the total capacity addition of NEPG which including Heilongjiang, Jilin and Liaoning province-level electricity systems during 2007 to 2009 consisting of 49,840MW of fossil fuel fired capacity, 6,300MW of hydropower capacity and 0MW

[23] EB guidance for "Request for guidance: Application of AM0005 and AMS-ID in China, 2005.10.7": Request for clarification on use of approved methodology AM0005 for several projects in China.
http://cdm.unfccc.int/Projects/deviations/87512

of nuclear power capacity, and 4,420MW of wind power and other capacity[24], the total capacity addition during 2007 to 2009 comprises 24.47% of the system generation in 2009.

3. To be conservative, zero emission factors were selected for hydropower capacity and other capacity. Moreover, since specific data on coal fired capacity, oil fired capacity, and gas fired capacity could not be separated from current statistical data on fossil fuel fired capacity, the following approach was adopted for calculating the emission factor of fossil fuel fired capacity addition:

Sub-step 1: Calculate the proportion of CO_2 emissions related to consumption of coal, oil and gas fuel used for power generation as compared to total CO_2 emissions from the total fossil fuelled electricity generation (sum of CO_2 emissions from coal, oil and gas).

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j}} \quad (7)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j}} \quad (8)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j}} \quad (9)$$

Where:
$F_{i,j,y}$ = The amount of fossil fuel type *i* consumed by power plants / units in province *j* in year y (mass or volume unit);
$NCV_{I,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/ mass or volume unit), National fixed value;
$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
Coal, Oil and Gas is solid fuel, liquid fuel and gas fuel respectively (See details of calculation in Annex 4).

Sub-step 2: Calculate the emission factor of fuel-based generation:

$$EF_{Thermal} = \lambda_{COAL} \times EF_{COAL,Adv} + \lambda_{OIL,Adv} \times EF_{OIL,Adv} + \lambda_{GAS} \times EF_{GAS,Adv} \quad (10)$$

Where:
$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are the emission factors for the best commercially available technology of coal fired power generation, oil fired power generation, and gas fired power generation, respectively (See Annex 4 for detailed calculation).

A coal-fired power plant with a total installed capacity of 600MW is assumed to be the commercially available best practice technology in terms of efficiency. The estimated coal consumption of such a National Sub-critical Power Station with a capacity of 600MW is 311.5gce/kWh, which corresponds to an efficiency of 39.45% for electricity generation[25].

[24] China Electric Power Yearbook 2008-2010
[25] Chinese DNA release the data at the website: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

For gas and oil power plants a 200MW power plant with a specific fuel consumption of 237.4gce/kWh, which corresponds to an efficiency of 51.77% for electricity generation[26], is selected as commercially available best practice technology in terms of efficiency.

Sub-step 3: Calculate the Building Margin emission factor:

$$EF_{grid,BM,y} = \frac{EF_{Thermal} \times CAP_{Thermal}}{CAP_{Total}} \quad (11)$$

Where:
CAP_{Total} = The total capacity addition
$CAP_{Thermal}$ = The fossil fuel fired capacity addition

Following the four steps above, the build margin emission factor $EF_{grid,BM,y}$ of the Northeast Power Grid is calculated to be 0.5987 tCO_2/MWh. The detailed calculations and data are listed in Annex 4.

Step 6 Calculate the combined margin emissions factor
The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (12)$$

Where:
$EF_{grid,BM,y}$ =Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ =Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} =Weighting of operating margin emissions factor (%)
w_{BM} =Weighting of build margin emissions factor (%)

For the Proposed Project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non dispatchable nature) for the first crediting period and for subsequent crediting periods.

The default weights are adopted for the Proposed Project, the baseline emission factor is:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

$$= 0.75 * 1.0852 + 0.5987 * 0.25 = 0.9635 tCO_2 / MWh$$

- **Leakage:**

No leakage emissions are considered.

- **Emission reductions:**

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel-fired power plants by renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (LE_y), as follows:

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (13)$$

[26] Chinese DNA release the data at the website: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

Where:

ER_y: Emission reduction (tCO_2) in year y
BE_y: Baseline emission (tCO_2) in year y
PE_y: Project emission (tCO_2) in year y
LE_y: leakage emissions (tCO_2) in year y

The Proposed Project is a new installed wind power farm. As mentioned above, $PE_y = 0$. Therefore,

$$ER_y = BE_y \quad (14)$$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	**$FC_{i,y,}$**
Unit	Mass or volume unit
Description	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data	China Energy Statistical Yearbook 2008-2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	The data is from the official documents published by China Government
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	**EG_y**
Unit	MWh
Description	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y
Source of data	China Electric Power Yearbook 2008-2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	The data is from the official documents published by China Government
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	$F_{i,j,y}$
Unit	Tonnes or m^3
Description	The amount of fuel type i (in a mass or volume unit) consumed in province j in years y
Source of data	China Energy Statistics Yearbook 2008-2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	This data is from the official documents published by China Government
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	$EG_{i,y}$
Unit	MWh
Description	Net electricity generated and delivered to the grid by power source i serving the system, not including low-cost / must-run power plants / units, in year *y*
Source of data	China Electric Power Yearbook 2008-2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	This data is from the official documents published by China Government
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	**Internal power consumption of power plants**
Unit	%
Description	Internal power consumption of power plants (fraction)
Source of data	China Electric Power Yearbook 2008-2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	This data is from the official documents published by China Government
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	**Efficiency of advanced thermal power plant additions**
Unit	%
Description	Efficiency of advanced thermal power plant additions
Source of data	China Energy Statistics Yearbook 2008-2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	This data is from the official documents published by China Government
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	**Electricity imports from other connected grids**
Unit	MWh
Description	Electricity imports from other connected grids
Source of data	2011 Baseline Emission Factors for Regional Power Grids in China issued by NDRC
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	There is no electricity import from other connected grids to Northeast Grid. This data is from the official documents published by China Government.
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	**$NCV_{i,y}$**
Unit	GJ/mass or volume unit
Description	The net calorific value (energy content) of fossil fuel type i in year y
Source of data	China Energy Statistic Yearbook 2008 ~ 2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	National specific data are publicly issued.
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of fossil fuel type i in year y
Source of data	Table 1.4 of Chapter 1 of Vol.2 of the 2006 IPCC Guidelines
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	The default data from IPCC.
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	CAP_{Total}
Unit	MW
Description	Total newly capacity addition exceeds 20% on different power sources connected to the grid
Source of data	China Electric Power Yearbook 2008-2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	This data is from the official documents published by NDRC
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	$CAP_{Thermal}$
Unit	MW
Description	Newly capacity addition on thermal power sources connected to the grid
Source of data	China Electric Power Yearbook 2008-2010
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	This data is from the official documents published by NDRC
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	$EF_{Coal,adv,y}$
Unit	tCO_2/MWh
Description	The emission factor of coal-fired power plants with best technology commercially available
Source of data	*2011 Baseline Emission Factors for Regional Power Grids in China*
Value(s) applied	0.7967
Choice of data or Measurement methods and procedures	Data used are from Chinese authorities
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	$EF_{oil,adv,y}$
Unit	tCO_2/MWh
Description	The emission factor of oil -fired power plants with best technologies commercially available
Source of data	*2011 Baseline Emission Factors for Regional Power Grids in China*
Value(s) applied	0.5250
Choice of data or Measurement methods and procedures	Data used are from Chinese authorities
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

Data / Parameter	$EF_{gas,adv,y}$
Unit	tCO_2/MWh
Description	The emission factor of gas-fired power plants with best technologies commercially available
Source of data	*2011 Baseline Emission Factors for Regional Power Grids in China*
Value(s) applied	0.3776
Choice of data or Measurement methods and procedures	Data used are from Chinese authorities
Purpose of data	Calculation of baseline emissions
Additional comment	It is fixed during the first crediting period and should be updated in the second crediting period.

B.6.3. Ex ante calculation of emission reductions

>>

According to the Feasibility Study Report of the Proposed Project, the electricity supplied by the Project activity to the Grid is 96,576MWh per year once fully operation. The Project is a new wind power farm. Thus,

$$EG_{PJ,y} = EG_{facility,y} = 96{,}576\,\text{MWh}$$

The baseline emission factor is calculated by using operating and build margins as described in the detail in sector B.6.1.

$$EF_{grid,CM,y} = 0.9635 tCO_2 / MWh$$

Thus baseline emissions are:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = 96{,}576\text{MWh} \times 0.9635 tCO_2 / MWh = 93{,}051 tCO_2 e$$

Both project emission (PE_y) and leakage emissions (LE_y) are zero, therefore, $ER_y = BE_y$

The total estimated emission reductions from the Proposed Project are 93,051t CO_2e /yr.

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
01/04/2013-31/03/2014	93,051	0	0	93,051
01/04/2014-31/03/2015	93,051	0	0	93,051
01/04/2015-31/03/2016	93,051	0	0	93,051
01/04/2016-31/03/2017	93,051	0	0	93,051
01/04/2017-31/03/2018	93,051	0	0	93,051
01/04/2018-31/03/2019	93,051	0	0	93,051
01/04/2019-31/03/2020	93,051	0	0	93,051
Total	**651,357**	**0**	**0**	**651,357**
Total number of crediting years				**7**
Annual average over the crediting period	93,051			

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

According to ACM0002, the monitored data and parameters are listed as following:

Data / Parameter	$EG_{facility, y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	Electricity meter(s)
Value(s) applied	96,576
Measurement methods and procedures	Net electricity generation is calculated as the difference between power exported ($EG_{out,y}$) to and imported ($EG_{im,y}$) from the grid, which are continuously measured and recorded monthly. Calculated as $EG_{facility,y} = EG_{out,y} - EG_{im,y}$ $EG_{out,y:}$ electricity supplied by the project activity to the grid in year y $EG_{im,y:}$ electricity imported from the grid by the proposed project in year y The value of $EG_{out,y}$ in the PDD is from the FSR, the real value will be measured by electricity meters installed with the relevant and applicable standard. The value of $EG_{im,y}$ in the PDD was assumed to be 0, the real value will be measured by electricity meters installed with the relevant and applicable standard.
Monitoring frequency	Continuously measured and recorded monthly
QA/QC procedures	Cross check measurement results with the invoices of electricity sold to the grid company.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data / Parameter	$EG_{im, y}$
Unit	MWh
Description	Electricity imported from the grid by the project activity in year y
Source of data	Measured by electricity meter
Value(s) applied	0
Measurement methods and procedures	The readings of the electricity meter will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the last crediting period. The electricity generation from the plant will be monitored and recorded at the central control room. The project operator is responsible for recording such data.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The accuracy of electricity meter will no lower than 0.5S. The meter would be calibrated according to relative national standards Receipts for electricity sales will be kept for further verification, when necessary.
Purpose of data	Used to calculate the $EG_{facility, y}$ of the proposed project
Additional comment	

Data / Parameter	$EG_{out, y}$
Unit	MWh
Description	Electricity export to the grid by the project activity in year y
Source of data	Measured by electricity meter

Value(s) applied	96,576
Measurement methods and procedures	The readings of the electricity meter will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the last crediting period. The electricity generation from the plant will be monitored and recorded at the central control room. The project operator is responsible for recording such data.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The accuracy of electricity meter will no lower than 0.5S. The meter would be calibrated according to relative national standards Receipts for electricity sales will be kept for further verification, when necessary.
Purpose of data	Used to calculate the $EG_{facility, y}$ of the proposed project
Additional comment	--

Please refer to Annex 4 for further background documentation.

B.7.2. Sampling plan

>>

Not applicable.

B.7.3. Other elements of monitoring plan

>>

This section details the steps taken to monitor the GHG emissions reductions on a regular basis from the Liaoning Guoli Fuxin Wangsiyingzi Wind Power Project in the Host Country.

The monitoring set-up for this Project has been developed to ensure that from the start, the Project is well-organised in terms of the collection and archiving of complete and reliable data.

CDM monitoring organisation

Roles and responsibilities will be defined for relevant staff involved in CDM monitoring, and the prospect of nominating a CDM Manager will be considered. If appointed, the CDM Manager will have the overall responsibility for the monitoring system on this project. All staff involved in the collection of data and records will be coordinated by him. The Project owner will take the responsibility for the monitoring plan implementation. A CDM team is to be established and consists of project manager, CDM manager, technical staff, and statistic staff.

Organizing structure of the CDM team is shown as figure B-2.

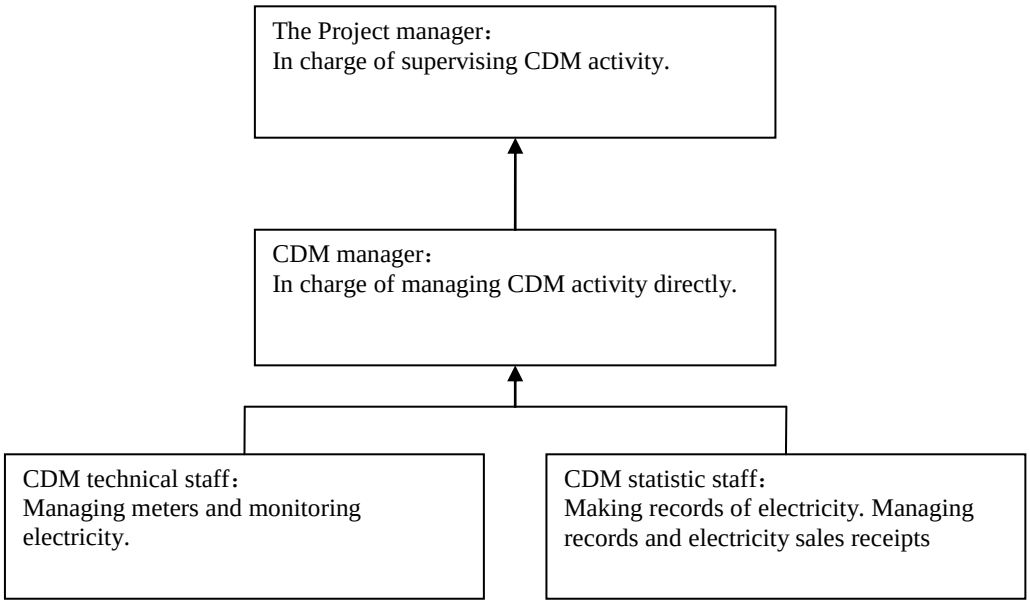

Figure B-2 Structure of the CDM team

Monitoring program and equipments

The quantity of net electricity generation supplied by the Proposed Project to the grid ($EG_{facility, y}$) will be calculated as following:

$EG_{facility,y} = EG_{out,y} - EG_{im,y}$

A key meter will be installed to monitor the electricity supplied to the grid and the electricity imported from the grid. In order to keep the consistency of measuring, a backup meter will also be installed. The final electricity sent to the grid will be determined by the key meter and when the key meter is out of operation, the backup meter will be used. Before being put into operation, the meters should be checked by a third party co-authorized by the owner and the local grid company.

The calibration procedures will be implemented in accordance with *Technical administrative code of electric energy metering (DL/T448—2000)*, which came into force in 2000, the owner and the grid company should co-authorize a third party, qualified metrical organization to conduct the calibration of the devices accordance with *Electronic energy meter testing procedures (JJG 596-1999).*

Maintenance and calibration of monitoring equipment

The electricity meters measuring power output & input to the grid will be calibrated in line with the relevant and applicable standard. This will ensure that the equipment operates at no less than the stated level of accuracy 0.5s. The metering equipments will be calibrated annually by the qualified organization according to the requirement from the *Technical administrative code of electric energy metering (DL/T448—2000).*

Data collection and record-keeping arrangements

All CDM relevant data will be measured and collected as detailed in Section B.7.1. All data required for verification and issuance will be backed-up and retained for at least two years after the end of the crediting period or the last issuance of CERs of the Project, whichever occurs later.

Data quality control and quality assurance

All data collected on-site will be checked internally, the data should be checked by relevant electricity sales receipt of the project owner for the purpose of quality control, before being compiled in an

electronic format, to ensure that it is complete and of appropriate quality, and will perform a final check of the data, and analyse project performance prior to any verification.

Date of completion: 20/08/2012

Person/entity determining the baseline:

Mr. Zhong Yongan, Mr Lin Songtao, Mr Zhang Feida and Mr Xu Tianshung
COWI China (Beijing) Co., Ltd.
Maizidian Street 37, Sunflower Tower 2010, Chaoyang District, Beijing 100026, P.R.China
Phone: 0086 10 8527 6970
Fax: 0086 10 8527 6974
Email: zyan@cowi.cn

The experts/entity above from COWI Consulting are not project participants.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
28/2/2012 (the date on which the main equipment purchase contract was signed).

C.1.2. Expected operational lifetime of project activity

>>
20 years and 0 month .

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
The 7 x 3-year renewable crediting period is chosen

C.2.2. Start date of crediting period

>>
01/04/2013.

C.2.3. Length of crediting period

The first, second and third crediting period is 7 years and 0 month.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The Environmental Impact Assessment (EIA) of the Proposed Project activity was approved by Liaoning Provincial Environmental Protection Bureau on 29th December, 2011 (Document number: Liao Huan Shen Biao [2011] #52). In accordance with Chinese regulation, the EIA report has been reviewed by relevant experts. The EIA identified the potential environmental impacts during the period of project construction and operation, and proposed the response measures to mitigate environmental impacts.

The outcome of EIA indicated that there are no significant environmental impacts caused by development and implementation of the project activity under the circumstances that recommended ecological protection and pollution control have been fulfilled. According to the EIA report and comments in Environmental Impact Statement Form issued by Liaoning Provincial Environmental Protection Bureau, environmental impacts possibly caused by the project and mitigating measures adopted by the project owner during stages of the project construction and operation are analyzed as follows:

Construction stage

Ecological impact

There are only ordinary plants and animals without any scarce plant and animal in the site of the Proposed Project. No extermination of plant and animal will result from the project. The vegetation area will not be changed because the project owner will replant during the project construction.

Atmosphere

Due to the earthwork excavation and the construction transportation dust, re-entrainment of dust is possibly generated around working area and nearby. The project owner will control suspended dust by means:

1) Stack all construction materials in a settled area;
2) Prohibit operation under strong wind and spray in windy weather;
3) Wet dust.

Waste water

Water will be transported from the urban area and stored in the working area. Since wastewater quantity is fairly small, the impact of wastewater is not significant.

Noise

The running noise of mechanical facilities and the traffic noise are the main source of noises in the construction process. However, as the construction site is far from local residence, there is less impact on local residents. The Project owner will control and manage the noise pollution source during the construction in order to be in line with the relevant rules of the Noise Limits on the Border of the Construction Site (GB12523-90).

Solid Waste

Solid waste mainly comes from excavated soil. The volume of excavated soil will be equal to the volume of the soil applied in back-fill and road construction basically. The project owner will pile up the excavated soil in designated area and use to back-fill as soon as possible. Therefore, the impact of solid waste is not significant.

Operation stage

Ecological impact

Overseas research on modern wind farms shows that the probability of bird injury caused by wind turbine is only 10% of that caused by high-voltage transmission lines, and is similar with the probability caused by cars on the highway. The Proposed Project is far from natural reserve and migration route of the birds, which is protected by the regulations. Therefore, the project will not impact birds significantly.

Atmosphere

Electrical appliances, including heating systems will be applied for the living activity of the staff of the project.

Waste water

Wastewater will be mainly domestic wastewater generated by living activities of the staff, which will use only small quantity of water. Wastewater and sanitary wastewater will not be directly discharged into the surrounding waters. The waste water will be treated by separation sedimentation tank, and then reutilized

for flushing roads and irrigation. There will be an environmental friendly toilet which will be able to treat sanitary wastewater in the site of the project. Therefore, the impact of wastewater is limited and mitigated.

Noise
The noise of wind power turbine generator system over the operation period comes from the friction between wind and blades and from the running mechanical parts inside it. The mechanical noise inside the wind turbine is the main noise source. The noise value on the tower base is less than 60 dB(A). Resident area will be over 800m far away from the wind turbines. The buildings for the wind farm staff will be far away from the wind turbines as well. The noise impact will be in line with the rules in the national standard "Noise Limits on the Border of the Industrial Corporation (GB12348-90) – Class II".

Solid Waste
Solid waste will be mainly generated by living activities of the project. The project owner will control the solid waste by:

1) Piling up solid waste centrally and disposing of it regularly in a designated place;
2) Using an environmental friendly toilet for biological treatment of sanitary waste;
3) Collecting used lubricants of the wind turbines, which will be disposed by qualified corporation and reutilized.

Electromagnetic Interference
Electromagnetic interference is inverse-proportional to the distance between transformer equipments and the object. The Electromagnetic interference will be lower than the limits defined in national environmental protection standard in the place, which is 20m far away from the transformer station. And there will be not any objective sensitive to electromagnetic interference within 20m around the transformer station.

In conclusion, the Proposed Project is located on a site rich in wind resources. The development of the Proposed Project is in compliance with the developing objective of the Chinese energy industry, and obviously it will contribute to the sustainable development in the way of GHG emission reduction, local air-pollution reduction, the improvement of local living standards etc. The construction of this project has no negative impact on local environment. Therefore, the Proposed Project is feasible from the environmental point of view.

D.2. Environmental impact assessment
>>
The environmental impacts of the Proposed Project are not significant.

SECTION E. Local stakeholder consultation
E.1. Solicitation of comments from local stakeholders
>>
From April 20th, 2012 to April 30st, 2012, the project owner put up posters of proposed project in the market fair of Furong Town which is the nearest residents' settlement to the proposed project. The project owner also requested local broadcasting station to disseminate information of the proposed project to the local community. When the villagers reading the announcements, the project owner randomly sent out questionnaires to local people and returned with comments. The project owner went to the farmers' family who are near to the proposed project, communicated on the impact from the proposed project and invited 50 people of them to fill out the questionnaires.

The questionnaire was made to investigate the impacts on local ecological environment and economy and the opinions from the potential stakeholders. The survey of questionnaires focus on the following issues:

- Whether stakeholders know the Proposed Project and CDM?

- What is the attitude of stakeholders to the project?
- Whether there exists any impact on the environment?
- Whether the project can improve the local economy and living quality?

General background of participants to fill out the questionnaires is listed as follows:

Overview of general background of participants

Gender	Number	Percentage
male	30	60%
female	20	40%

Age	Number	Percentage
18-35	23	46%
36-55	20	40%
over 55	7	14%

Education Level	Number	Percentage
University level	1	2%
High school	20	40%
Middle school	29	58%

Occupation	Number	Percentage
Public Servant	3	6%
Farmers	27	54%
Workers	20	40%

The respondents are representative in terms of gender, age, education level and occupation. Their opinions on project could be the general reaction of the stakeholders toward Proposed Project.

E.2. Summary of comments received

>>

As received 50questionnaires, 100% of the respondents of the Proposed Project and 34% of them know CDM, and the respondents expressed their fully support on the development of the project.

The outcome of the survey indicated that it is generally believed that the constructions and the implementation of the project will contribute to the local environment and living quality. The public would like the projects could be put into operation as soon as possible.

The survey had a 100% response rate (all questionnaires returned) and the following is a summary of the key findings:

- 50 (100%) of the respondents know the Proposed Project;
- On the livelihoods of local residents: 100% of the respondents believe the Proposed Project will improve their livelihoods. 28% believe that the project will ease the shortage of power supply, 40% of the respondents agree that the Proposed Project will improve the transportation environment, 62% believe that the Proposed Project will improve the living quality and 44% believe that the Proposed Project will increase their income.
- On the local environment: 100% of the respondents believe the project will not bring significant bad impacts on local environment;

- On the local economy: 100% of the respondents believe that the Proposed Project will promote the local economic development by ease the shortage of power supply, increase job opportunities, reduce environment pollution and Contribute to development of tourism resources .

Conclusion:

The survey shows that the Proposed Project receives strong support from local people, which is closely linked to the fact that the majority of local residents have some understanding of the Proposed Project.

All of the respondents believe that the project will have overall positive impacts on their livelihoods with an increase in job opportunities, increase of income, ease the shortage of power supply and others impacts. All the respondents believe the project will not bring significant bad impacts on local environment and the concern about the environmental impacts has been clarified in EIA and all the impacts will be reduced by mitigating measures.

The government and authorities at all levels support the project construction actively, confirm its social and environmental benefits, and wish the construction could be started early and accelerated.

E.3. Report on consideration of comments received

>>

The major concerns of the local stakeholders on the Project are environmental and economic impacts on the local community. Regarding these concerns, the project owner gave a thorough and clear explanation, which is summarized as above.

Considering full support from the local stakeholders, there is no need to make adjustments on the design and implementation of the Project. Meanwhile, the project owner expressed that they would take full advantage of the CDM opportunity to facilitate the development of the project and also express their wishes that local stakeholders are welcome to monitor the course of the construction and implementation of these projects.

SECTION F. Approval and authorization

>>

The letter of approval for the project activity from the DNA of P.R. China was issued on 27th July 2012.

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Appendix 1: Contact information of project participants

Organization name	Liaoning Guoli Renewable Energy Co. Ltd.
Street/P.O. Box	No.188 west of South 4th ring road, Fengtai District
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E-mail	cgnwind@163.com
Website	/
Contact person	Shi Lei (Primary Signatory)
Title	/
Salutation	Mr.
Last name	Shi
Middle name	-
First name	Lei
Department	/
Mobile	/
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Contact person	Xu Xiansong (Alternate Signatory)
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Middle name	-
First name	Xiansong
Department	/
Mobile	/
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Appendix 2: Affirmation regarding public funding

The project doesn't involve public funding from Parties included in Annex I countries.

Appendix 3: Applicability of selected methodology

No information is provided.

Appendix 4: Further background information on ex ante calculation of emission reductions

Table 1–Power Supply data for the Northeast Power Grid, 2007

	Thermal Power Generation (MWh)	Rate of Electricity Consumption of the Power Plant (%)	Power Supplied to the Grid(MWh)
Liaoning	106,500,000	7	99,045,000
Jilin	43,700,000	7.68	40,343,840
Heilongjiang	68,400,000	7.67	63,153,720
Total Supplied to Grid of the Thermal Power (MWh)			202,542,560

Data source: China Electric Power Yearbook 2008.

Table 2–Power Supply data for the Northeast Power Grid, 2008

	Thermal Power Generation (MWh)	Rate of Electricity Consumption of the Power Plant (%)	Power Supplied to the Grid(MWh)
Liaoning	108,500,000	7.18	100,709,700
Jilin	46,400,000	7.76	42,799,360
Heilongjiang	71,500,000	7.53	66,116,050
Total Supplied to Grid of the Thermal Power (MWh)			209,625,110

Data source: China Electric Power Yearbook 2009.

Table 3–Power Supply data for the Northeast Power Grid, 2009

	Thermal Power Generation (MWh)	Rate of Electricity Consumption of the Power Plant (%)	Power Supplied to the Grid(MWh)
Liaoning	113,500,000	6.94	105,623,100
Jilin	47,300,000	7.89	43,568,030
Heilongjiang	69,400,000	7.29	64,340,740
Total Supplied to Grid of the Thermal Power (MWh)			213,531,870

Data source: China Electric Power Yearbook 2010.

Table 4– Energy Consumption Statistics of Power Generation of the Northeast Power Grid in 2007

Fuel	**Unit**	**Liaoning A**	**Jilin B**	**Heilongjiang C**	**Total D=A+B+C**
Raw coal	10^4 tons	4869.32	2873.45	3736.11	**11478.88**
Cleaned coal	10^4tons				**0**

Other washed coal	10^4tons	747.85	16.52	106.81	**871.18**
Briquettes	10^4tons				**0**
Coke	10^4tons	4.99			**4.99**
Coke oven gas	10^8m3	5.53	1.44	1.89	**8.86**
Other coal gas	10^8m3	68.38	9.06		**77.44**
Crud oil	10^4tons	0.24			**0.24**
Gasoline	10^4tons				**0**
Diesel oil	10^4tons	0.96	0.39	0.47	**1.82**
Fuel oil	10^4tons	8.43	0.45	1.48	**10.36**
LPG	10^4tons				**0**
Refinery gas	10^4tons	7.33		1.99	**9.32**
Natural gas	10^8m3		0.02	2.03	**2.05**
Other petroleum products	10^4tons	0.01			**0.01**
Other coke products	10^4tons	0.46			**0.46**
Other energy	10^4tons-tce	12.41	2.43	51.35	**66.19**

Data source: China Energy Statistical Yearbook 2008.

Table 5– Calculation of the OM Emission Factor for the Northeast Power Grid in 2007

Fuel	Unit	Fuel Consumption in the NEPG (D)	Emission Factor (tC/TJ) (E)	Oxidation Rate (%) (F)	Average NCV (MJ/t,km3) (G)	Effective CO_2 emission factor ($kgCO_2/TJ$) (H)	CO_2 emisson(tCO_2e) I=D ×G ×H/100000 (in masse) I=D ×G ×H/10000 (in volume)
Raw coal	10^4 tons	**11478.88**	25.8	100	87,300	20,908	209,520,369
Cleaned coal	10^4tons	**0**	25.8	100	87,300	26,344	0
Other washed coal	10^4tons	**871.18**	25.8	100	87,300	8,363	6,360,397
Briquettes	10^4tons	**0**	26.6	100	87,300	20,908	0
Coke	10^4tons	**4.99**	29.2	100	95,700	28,435	135,789
Coke oven gas	10^8m3	**8.86**	12.1	100	37,300	16,726	552,758
Other coal gas	10^8m3	**77.44**	12.1	100	37,300	5,227	1,509,825
Crud oil	10^4tons	**0.24**	20	100	71,100	41,816	7,135
Gasoline	10^4tons	**0**	18.9	100	67,500	43,070	0
Diesel oil	10^4tons	**1.82**	20.2	100	72,600	42,652	56,357
Fuel oil	10^4tons	**10.36**	21.1	100	75,500	41,816	327,076
LPG	10^4tons	**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4tons	**9.32**	15.7	100	48,200	46,055	206,890
Natural gas	10^8m3	**2.05**	15.3	100	54,300	38,931	433,360
Other petroleum products	10^4tons	**0.01**	20	100	72,200	41,816	302
Other coke products	10^4tons	**0.46**	25.8	100	95,700	28,435	12,518
Other energy	10^4tons-tce	**66.19**	0	0	0	0	0
Total emission (Q)							219,122,778

Table 6– Energy Consumption Statistics of Power Generation of the Northeast Power Grid in 2008

Fuel	Unit	Liaoning A	Jilin B	Heilongjiang C	Total D=A+B+C
Raw coal	10^4 tons	4973.05	3289.16	3873.45	**12135.66**
Cleaned coal	10^4tons				**0**
Other washed coal	10^4tons	791.96	15.58	112.97	**920.51**
Briquettes	10^4tons				**0**
Coke	10^4tons	5.77			**5.77**
Coke oven gas	10^8m3	4.12	1.06	5.54	**10.72**
Other coal gas	10^8m3	61.11	7.63		**68.74**
Crud oil	10^4tons	0.37			**0.37**
Gasoline	10^4tons	0.02			**0.02**
Diesel oil	10^4tons	0.84	1.07	0.37	**2.28**
Fuel oil	10^4tons	10.64	1.06	1.29	**12.99**
LPG	10^4tons				**0**
Refinery gas	10^4tons	7.54		3.77	**11.31**
Natural gas	10^8m3		0.39	1.85	**2.24**
Other petroleum products	10^4tons				**0**
Other coke products	10^4tons				**0**
Other energy	10^4tons-tce	16.9	3.04	68.19	**88.13**

Data source: China Energy Statistical Yearbook 2009.

Table 7– Calculation of the OM Emission Factor for the Northeast Power Grid in 2008

Fuel	Unit	Fuel Consumption in the NEPG (F)	Emission Factor (tC/TJ) (G)	Oxidation Rate (%) (H)	Average NCV (MJ/t,km3) (I)	Effective CO_2 emission factor ($kgCO_2/TJ$) (J)	CO_2 emisson(tCO_2e) K=F*I*J/100000 (in masse) K=F*I*J/10000 (in volume)
Raw coal	10^4 tons	**12135.66**	25.8	100	87,300	20,908	221,508,367
Cleaned coal	10^4tons	**0**	25.8	100	87,300	26,344	0
Other washed coal	10^4tons	**920.51**	25.8	100	87,300	8,363	6,720,551
Briquettes	10^4tons	**0**	26.6	100	87,300	20,908	0
Coke	10^4tons	**5.77**	29.2	100	95,700	28,435	157,015
Coke oven gas	10^8m3	**10.72**	12.1	100	37,300	16,726	668,799
Other coal gas	10^8m3	**68.74**	12.1	100	37,300	5,227	1,340,204
Crud oil	10^4tons	**0.37**	20	100	71,100	41,816	11,001
Gasoline	10^4tons	**0.02**	18.9	100	67,500	43,070	581
Diesel oil	10^4tons	**2.28**	20.2	100	72,600	42,652	70,601
Fuel oil	10^4tons	**12.99**	21.1	100	75,500	41,816	410,108
LPG	10^4tons	**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4tons	**11.31**	15.7	100	48,200	46,055	251,065
Natural gas	10^8m3	**2.24**	15.3	100	54,300	38,931	473,526
Other petroleum products	10^4tons	**0**	20	100	72,200	41,816	0
Other coke products	10^4tons	**0**	25.8	100	95,700	28,435	0
Other energy	10^4tons-tce	**88.13**	0	0	0	0	0
Total emission (Q)							231,611,818

Table 8– Energy Consumption Statistics of Power Generation of the Northeast Power Grid in 2009

Fuel	Unit	Liaoning A	Jilin B	Heilongjiang C	Total D=A+B+C
Raw coal	10^4 tons	5297.77	2999.09	3691.92	**11988.78**
Cleaned coal	10^4tons				**0**
Other washed coal	10^4tons	662.76	19.67	98.77	**781.2**
Briquettes	10^4tons			1.18	**1.18**
Coke	10^4tons	4.19			**4.19**
Coke oven gas	10^8m3	4.97	1.77	2.51	**9.25**
Other coal gas	10^8m3	75.72	13.88	0.11	**89.71**
Crud oil	10^4tons	0.79			**0.79**
Gasoline	10^4tons				**0**
Diesel oil	10^4tons	0.44	0.42	0.43	**1.29**
Fuel oil	10^4tons	3.32	0.79	1.39	**5.5**
LPG	10^4tons				**0**
Refinery gas	10^4tons	7.78		3.21	**10.99**
Natural gas	10^8m3		1.97	1.86	**3.83**
Other petroleum products	10^4tons	0.44			**0.44**
Other coke products	10^4tons				**0**
Other energy	10^4tons-tce	18.24	15.93	107.82	**141.99**

Data source: China Energy Statistical Yearbook 2010.

Table 9– Calculation of the OM Emission Factor for the Northeast Power Grid in 2009

Fuel	Unit	Fuel Consumption in the NEPG (F)	Emission Factor (tC/TJ) (G)	Oxidation Rate (%) (H)	Average NCV (MJ/t,km3) (I)	Effective CO_2 emission factor ($kgCO_2/TJ$) (H)	CO_2 emisson(tCO_2e) I=D ×G ×H/100000 (in masse) I=D ×G ×H/10000 (in volume)
Raw coal	10^4 tons	**11988.78**	25.8	100	87,300	20,908	218,827,413
Cleaned coal	10^4tons	**0**	25.8	100	87,300	26,344	0
Other washed coal	10^4tons	**781.2**	25.8	100	87,300	8,363	5,703,462
Briquettes	10^4tons	**1.18**	26.6	100	87,300	20,908	21,538
Coke	10^4tons	**4.19**	29.2	100	95,700	28,435	114,020
Coke oven gas	10^8m3	**9.25**	12.1	100	37,300	16,726	577,089
Other coal gas	10^8m3	**89.71**	12.1	100	37,300	5,227	1,749,050
Crud oil	10^4tons	**0.79**	20	100	71,100	41,816	23,488
Gasoline	10^4tons	**0**	18.9	100	67,500	43,070	0
Diesel oil	10^4tons	**1.29**	20.2	100	72,600	42,652	39,945
Fuel oil	10^4tons	**5.5**	21.1	100	75,500	41,816	173,641
LPG	10^4tons	**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4tons	**10.99**	15.7	100	48,200	46,055	243,962
Natural gas	10^8m3	**3.83**	15.3	100	54,300	38,931	809,644
Other petroleum products	10^4tons	**0.44**	20	100	72,200	41,816	13,284
Other coke products	10^4tons	**0**	25.8	100	95,700	28,435	0
Other energy	10^4tons-tce	**141.99**	0	0	0	0	0
Total emission (Q)							228,296,535

$EF_{grid, OM, y} = (Q_{2007} + Q_{2008} + Q_{2009}) / (P_{2007} + P_{2008} + P_{2009}) = 1.0852\ tCO_2e/MWh$

Calculation of the Build Margin Emission Factor of the Northeast Power Grid

Table 10 Share of different fossil fuels in the total CO_2 emissions from thermal power plants of the Northeast Power Grid

Item	Value
λcoal	98.41%
λoil	0.11%
λgas	1.48%

Table 11– Calculating of Emission Factor for Various Power Plants

Emission factor of Best Practiced Commercialized Technology						
	Variable	Supply Efficiency	Effective CO_2 emission factor	Oxidation Rate (%) (G)	Emission Factor (tCO_2e/MWh)	$\lambda_{Fuel\ y}$
		A	B	C	D=3.6/A/100000 ×B ×C	
Coal Firing power plants	$EF_{Coal,Adv}$	39.45%	87,300	100%	0.7967	98.36%
Gas Firing Power Plants	$EF_{Gas,Adv}$	51.77%	75,500	100%	0.5250	0.04%
Oil Firing Power Plants	$EF_{Oil,Adv}$	51.77%	54,300	100%	0.3776	1.60%
Thermal Emission Factor (tCO2/MWh)	**$EF_{Thermal}$**	0.7902				

Table 12–Installed Capacity of the Northeast Power Grid in 2009

Installed Capacity	Unit	Liaoning	Jilin	Heilongjiang	Total
Thermal Power	(MW)	22,560	10,560	16,720	49,840
Hydro Power	(MW)	1,460	3,900	940	6,300
Nuclear Power	(MW)	0	0	0	0
Wind Power and others	(MW)	1,740	1,480	1,200	4,420
Sub-total	(MW)	25,760	15,940	18,860	60,560

Table 13–Installed Capacity of the Northeast Power Grid in 2008

Installed Capacity	Unit	Liaoning	Jilin	Heilongjiang	Total
Thermal Power	(MW)	19,900	8,350	16,570	44,820
Hydro Power	(MW)	1,430	3,890	940	6,260
Nuclear Power	(MW)	0	0	0	0
Wind Power and others	(MW)	859	760	620	2,239
Sub-total	(MW)	22,189	13,000	18,130	53,319

Table 14–Installed Capacity of the Northeast Power Grid in 2007

Installed Capacity	Unit	Liaoning	Jilin	Heilongjiang	Total
Thermal Power	(MW)	19,720	7,580	14,080	41,380
Hydro Power	(MW)	1,410	3,890	870	6,170
Nuclear Power	(MW)	0	0	0	0
Wind Power and others	(MW)	359	514	230	1,103
Sub-total	(MW)	21,489	11,984	15,180	48,653

Table 15– The BM Calculation of the Northeast Power Grid

		2007	2008	2009	Capacity Addition from 2007 to 2009	Capacity Addition from 2008 to 2009	Ratio of Capacity Addition
		A	B	C	D=C-A	D=C-B	
Thermal Power	(MW)	41,380	44,820	49,840	10,772	6,646	75.76%
Hydro Power	(MW)	6,170	6,260	6,300	130	40	0.91%
Nuclear Power	(MW)	0	0	0	0	0	0.00%
Wind Power and others	(MW)	1,103	2,239	4,420	3,317	2181	23.33%
Sub-total	(MW)	**48,653**	**53,319**	**60,560**	**14,219**	**8,867**	**100.00%**
Thermal Emission Factor (tCO2/MWh)	**0.7902**	**The Northeast Power Grid BM (tCO2/MWh)**	**0.5987**				

Table 16– Baseline Emission Factor of the Northeast Power Grid (tCO2/MWh)

A	Operating Margin Emission Factor (tCO_2/MWh)	1.0852
B	Build Margin Emission Factor (tCO_2/MWh)	0.5987
C	Combined Emission Factor (C=0.75*A+0.25*B) (tCO_2/MWh)	**0.9635**

Baseline Calculation

Table 17– Emission of the Project

Emission of the Project		
$EG_{PJ,y}$ (Electricity generated by the Proposed Project) (MWh)	*$EF_{electricity,y}$ (Emission factor of the Grid) (tCO_2/MWh)*	*$ER_{electricity,y}$ (Emission reduction of the Proposed Project) (tCO_2)*
96,576	*0.9635*	***93,051***

Appendix 5: Further background information on monitoring plan

No information is provided.

Appendix 6: Summary of post registration changes

No information is provided.

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History of the document

Version	Date	Nature of revision
02	20 August 2012	Revision after on-site validation
01	21 May 2012	Version for global stakeholder consultation